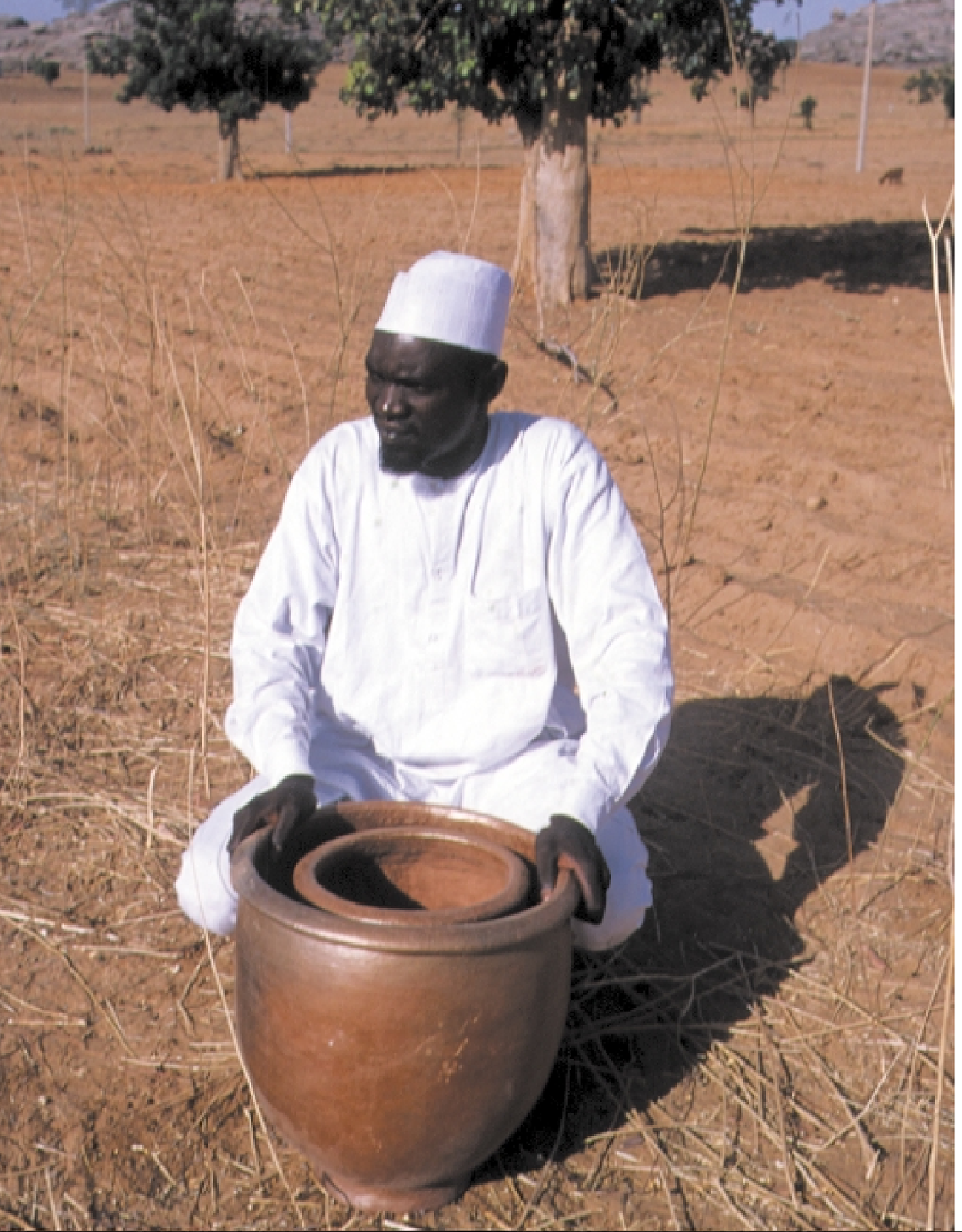


MOHAMMED BAH ABBA

Manufacture and supply an innovative earthenware cooling system to preserve perishable foods in developing countries with arid climates

Northern Nigeria is an impoverished region where people in rural communities eke out a living from subsistence farming. With no electricity, and therefore no refrigeration, perishable foods spoil within days. Such spoilage causes disease and loss of income for needy farmers, who are forced to sell their produce daily. Nigerian teacher Mohammed Bah Abba was motivated by his concern for the rural poor and by his interest in indigenous African technology to seek a practical, local solution to these problems. His extremely simple and inexpensive earthenware "Pot-in-Pot" cooling device is starting to revolutionise lives in this semi-desert area.

The art of pottery is deeply rooted in African culture. In northern Nigeria, earthenware pots have been used since ancient times as cooking and water storage vessels, coffins, wardrobes and banks. Today, these clay pots are almost extinct, replaced by aluminium containers and more modern methods of burying the dead, storing clothes and saving money.

Born into a family of earthen pot makers and raised in the rural north, Mohammed Bah Abba was from an early age familiar with the various practical and symbolic uses of traditional clay pots. As a child he learned the rudiments of pottery making and was struck by how the clay figures he moulded were water retentive and remained intact even when dry, unlike items made from other soils. Subsequently studying biology, chemistry and geology at school, Abba unravelled the technical puzzle that led him years later to create the "Pot-in-Pot Preservation/Cooling System".

The 36-year-old teacher has been selected as a Rolex Laureate for this ingenious technique that requires no external energy supply to preserve fruit, vegetables and other perishables in hot, arid climates. The Pot-in-Pot cooling system, a kind of "desert refrigerator", helps subsistence farmers in northern Nigeria by reducing food spoilage and waste and thus increasing their income and limiting the health hazards of decaying foods. "I invented the Pot-in-Pot system to help the development of the rural poor in a cost effective, participatory and sustainable way," says Abba.

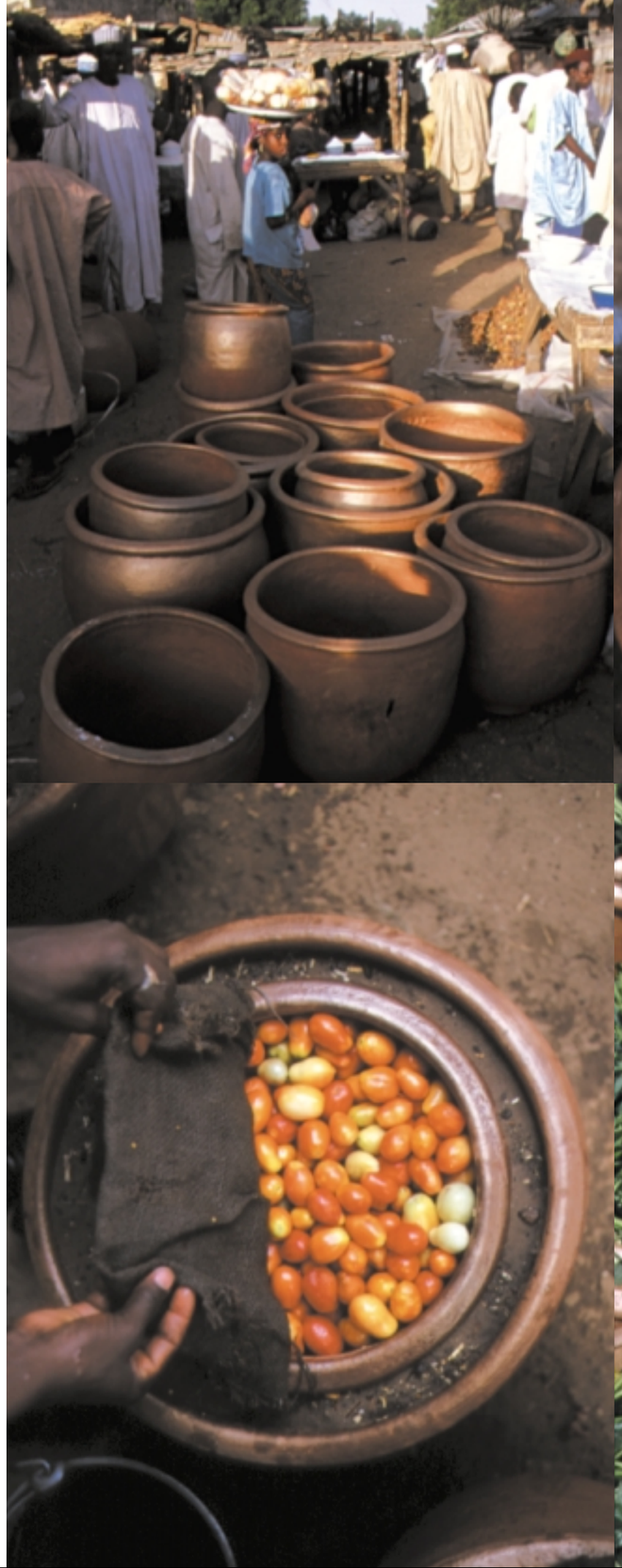
Semi-desert scrubland, subsistence farmers and lack of electricity

To understand the relevance of Abba's Rolex Award-winning project, it is necessary to look at the geography of northern Nigeria and the restricted lives led by the people. This region is primarily a semi-desert scrubland inhabited by a large, mostly agriculture-based population, the majority of whom live in abject poverty.

Polygamy is a dominant feature of the family structure, and women, living in purdah, are confined to their homes and seriously disadvantaged in terms of health care, education and employment opportunities. Young girls are particularly enslaved because they are forced to go out each day and quickly sell food that would otherwise perish, in order to add to the meagre family income.

Fundamental to the Pot-in-Pot project is the lack of electricity in most of the northern rural communities, for without electricity there can be no refrigeration. Even in towns and cities the power

Adapting an ancient technique to modern life, Rolex Laureate Mohammed Bah Abba has refined the "Pot-in-Pot" method of preserving fresh food by storing it in double-walled clay jars such as these seen in a Nigerian marketplace. Water contained in wet sand between the jars evaporates in desert heat, cooling the contents and preserving them for days. The method applies to such staple crops as spinach, tomatoes, onions and other perishables. The Pot-in-Pot could revolutionise life in rural Nigeria, where farmers are forced either to use or sell their crops the moment they are harvested.



supply is erratic, with some areas experiencing total blackouts for several weeks. Most of the urban poor cannot even afford refrigerators.

In the context of an economically drained nation facing severe communication, transport and utility problems, Abba responded to his country's need for managers and set out to try and help improve the ailing economy. He began by studying management sciences at Ahmadu Bello University in the town of Zaria. Equipped with a Bachelor of Science degree in business administration, he became a lecturer at the College of Business and Management Studies at Jigawa State Polytechnic in Dutse in 1990, at the same time heading the college's Student Industrial Work Experience Scheme. When not teaching, Abba serves as a consultant to the regional United Nations Development Programme (UNDP) in Jigawa, organising community activities and giving seminars. A staunch supporter of women's rights, he is also a consultant with the state's Ministry for Women Affairs and Social Mobilization.

These consultancies have brought Abba in close contact with rural communities, where he has observed the extreme hardships suffered by subsistence farmers and their families. "Through these observations, I became motivated to revitalise earthen pot usage and extend the life of perishable foods," he adds.

Raised in a family of traditional pot makers, Abba learned the trade as a boy in northern Nigeria before attending school and becoming a teacher in the south. Years later he returned home and recognised the need for an inexpensive method of preserving food. He hired and supervised skilled pot makers to produce thousands of the double-walled jars at his own expense.

By 1999 Abba had expanded his annual production of Pot-in-Pots to 7,000 jars, and he continued to distribute them free to rural families. He hopes that within five years the jars will be in use throughout northern Nigeria. He describes his Rolex Award as "highly timely" and envisions a day when the Pot-in-Pot will benefit other countries with similar hot, dry climates.

Vegetables, fruit and drinks cooled by a simple evaporation process

The innovative cooling system that Abba developed in 1995 consists of two earthenware pots of different diameters, one placed inside the other. The space between the two pots is filled with wet sand that is kept constantly moist, thereby keeping both pots damp. Fruit, vegetables and other items such as soft drinks are put in the smaller inner pot, which is covered with a damp cloth and left in a very dry, ventilated place. The phenomenon that occurs is based on a simple principle of physics: The water contained in the sand between the two pots evaporates towards the outer surface of the larger pot where the drier outside air is circulating. By virtue of the laws of thermodynamics, the evaporation process automatically causes a drop in temperature of several degrees, cooling the inner container, destroying harmful microorganisms and preserving the perishable foods inside.

Abba's first trials proved successful. Eggplants, for example, stayed fresh for 27 days instead of three, and tomatoes and peppers lasted for three weeks or more. African spinach, which usually spoils after a day, remained edible after 12 days in the Pot-in-Pot storage.

The enterprising teacher persistently refined his invention for two years between 1995 and 1997. He then tapped into the large unemployed local workforce and hired skilled pot makers to mass

produce the first batch of 5,000 Pot-in-Pots. Manufacturing these devices at his own expense for 30 US cents each, he began distributing them for free to five villages in Jigawa. For this initial phase of his project, he received limited financial backing from his brother and assistance in the form of transportation, fuel and labour from the UNDP, the regional government, a local women's development group and the Jigawa State Polytechnic.

In 1999, Abba built additional pot-making factories and supplied another dozen local villages with 7,000 pots, again at his expense. He estimates that three-quarters of the rural families in Jigawa are now using his cooling device.

An invention that helps women and girls particularly

The impact of the Pot-in-Pot on individuals' lives is overwhelming. "Farmers are now able to sell on demand rather than 'rush sell' because of spoilage," says Abba, "and income levels have noticeably risen. Married women also have an important stake in the process, as they can sell food from their homes and overcome their age-old dependency on their husbands as the sole providers." In turn, and perhaps most significantly for the advancement of the female population, Abba's invention liberates girls from having to hawk food each day. Instead, they are now free to attend school, and the number of girls enrolling in village primary schools is rising.

These factors, coupled with the effect that the Pot-in-Pot has had in stemming disease and slowing the pace of the rural exodus to cities, are what, in Abba's words, "make the Pot-in-Pot a tangible and exciting solution to a severe local problem".

Encouraged by these positive results, Abba will soon begin distributing the cooling devices to the four Nigerian states bordering Jigawa, starting with Yobe. However, looking at his experience over the past five years, he understands that one of the biggest obstacles is educating the villagers about this simple technology.

As training workshops and the use of "criers", village PR men, were only moderately successful, Abba has devised an educational campaign tailored to village life and the illiterate population. The innovative campaign features a video-recorded play by local actors who dramatise the benefits of the desert refrigerator. Abba has begun showing the video in villages using a makeshift cloth screen and a portable projector and generator. "Nightfall is best," he comments, "because this is when farmers head home and are keen to watch an entertaining presentation."

Abba has recently begun to sell his pots at 40 US cents a pair, 10 cents higher than the original production cost. While the proceeds will help finance manufacturing and distribution costs, he looks to the "very timely" Rolex Award to further his expansion plans. He estimates that it will take five years to cover the whole of northern Nigeria and hopes one day to export the Pot-in-Pot to other hot, dry countries facing similar problems.

Among major beneficiaries of the Pot-in-Pot are young Nigerian farm girls such as the two opposite, whose traditional task was to hawk their families' produce at daily markets. "Now," says Abba, "local farmers can sell on demand rather than 'rush sell,' and their daughters at last can attend school. Married women also benefit, for now they can sell food from their own homes and reduce their age-old dependency on their husbands as the sole providers. In fact, everyone benefits, for the reduction of waste and spoilage among crops has raised the average family income wherever Pot-in-Pots are used."

A further exciting option that the Rolex Laureate is considering is setting up a centre connected to the Internet to exchange information on traditional rural technology.

Well known for his dedication, Abba is also praised for his concern with the social and economic development of his fellow Nigerians. “Mr Abba cares for the progress of society in general,” says Mrs Hadiza Abdulwahab, president of the local Society for Women Empowerment and Development. The permanent secretary of the State Ministry of Women Affairs and Social Mobilization, Mrs Rabi Umar, concurs. She believes that Abba has been “selfless and tireless” in his efforts to make his project succeed. Summing up his work, she says: “The Pot-in-Pot project is the first to use simple cultural solutions to address the primary needs of the rural northern Nigerian population, for whom the basic necessities of life are nearly non-existent.”

Rural Nigerian women listen as Abba describes how the Pot-in-pot functions. The enterprising teacher has enlisted women’s help in educating others to benefits of the device. Recently he produced a video of a play by local actors dramatising the uses of his “desert refrigerator”.

“Mohammed Bah Abba’s idea of an earthenware cooling system... has a thousand social consequences for human health, employment of the young, especially women, and general well-being.”

“Abba’s project impressed me a great deal because of its apparent simplicity, yet it was highly innovative and pragmatic. He observed how difficult life was for the people of his rural community, as vegetables and fruit perished very quickly and affected their livelihoods. This is a marvellous example of how the innovation and spirit of enterprise of one man can affect positively the quality of life of a whole community.”
Dr Kanwaljit Soin

“Oftentimes the simpler a device, the greater its impact. Clearly, Mohammed Bah Abba’s 30-cent “Pot-in-Pot” cooling system can dramatically improve sanitation, a balanced diet, and quality of life for the poor rural population of Nigeria.”
Mr Gilbert M. Grosvenor

“There is no technology like apparently simple technology. The invention of the button and the stirrup changed the world. Mohammed Bah Abba’s idea of an earthenware cooling system may not change the world, but it could certainly change the local economy in Nigeria and other countries with a similar environment. It has a thousand social consequences for human health, employment of the young, especially women, and general well-being.”
Sir Crispin Tickell

“In a region like Africa, or in any other torrid climate, the idea of the “Pot-in-Pot” may improve a millennial way of life, without any revolutionary technological traumas. In this way the local people’s life patterns will be respected, thanks to Mohammed Bah Abba’s ingenious idea.”
Dr Giancarlo Ligabue

“This is a wonderfully simple and ingenious project, the flow-on benefits to the villages will be enormous. It really fulfils the conditions of the Rolex Awards of being truly enterprising and truly benefiting many people.”
Prof. Adrienne E. Clark